

Forest Habitats & Climate Change



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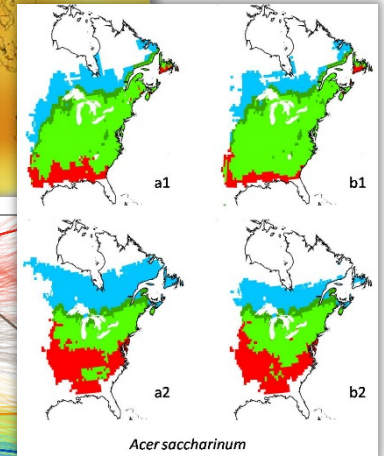
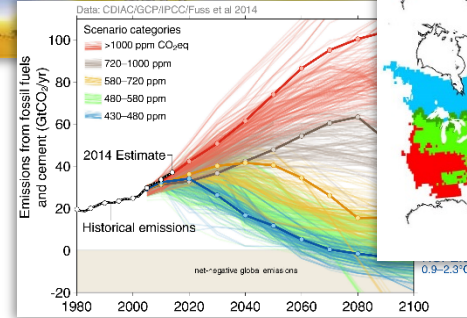
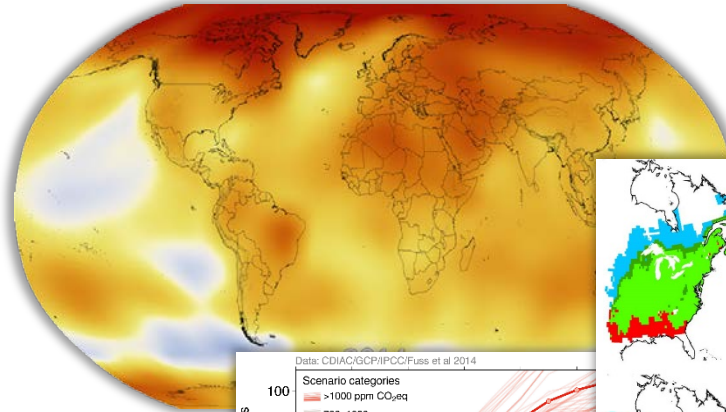
USDA Forest Service



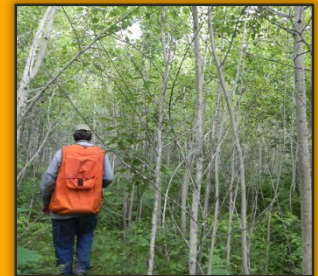
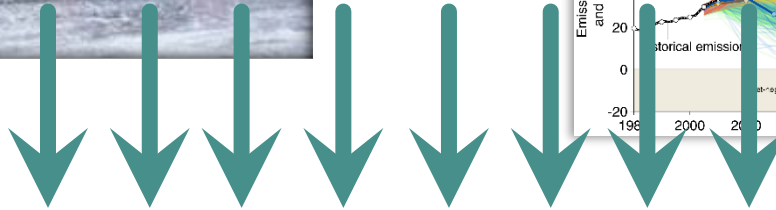
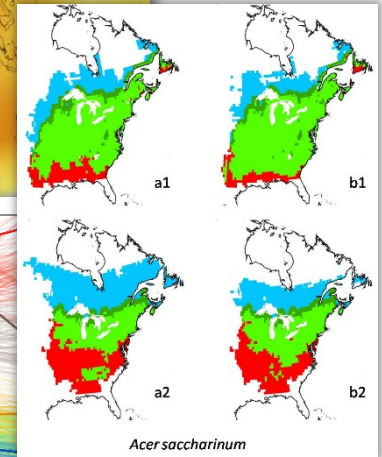
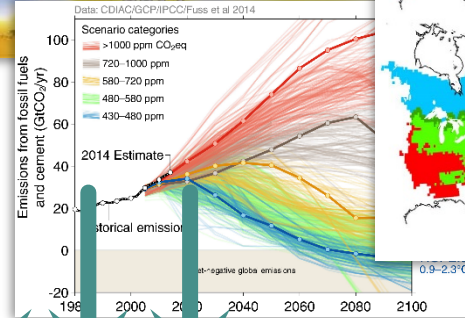
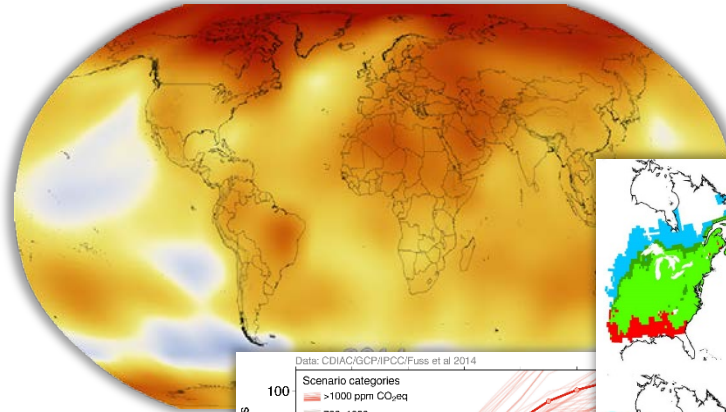
Climate Change Response Framework

www.forestadaptation.org

Considering Climate Change



Considering Climate Change

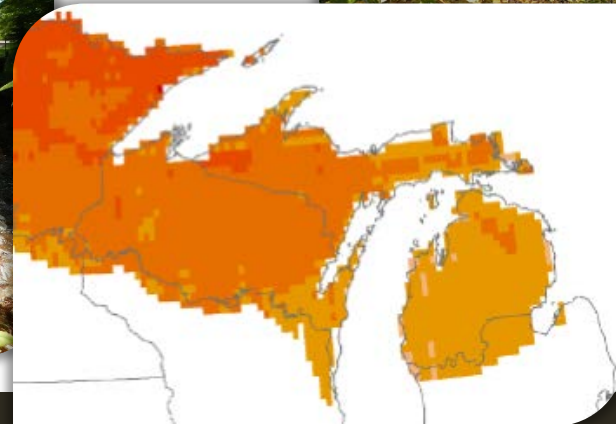


Habitat + Climate Change

- 1) Forests are changing, due to climate change.
- 2) Some species will fare better, others worse.
 - True for trees and wildlife
 - Climate Change Atlas: www.fs.fed.us/nrs/atlas
- 3) Site conditions and management actions will influence climate risk and opportunities

Changes in Climate

- Warmer temperatures
 - Longer growing seasons
 - Shorter winters
- Potential for drier summers
 - Moisture stress
 - Drought
- Altered precipitation
 - Increased variability
 - More extreme events



Changes in Forests

- Tree species responses
 - Declines in boreal & northern species
 - Southern species favored
 - Changes in forest composition & productivity
- Increased disturbance & stress
 - Drought, fire, extreme storms
 - Forest pests & diseases
 - Invasive species



How will species respond?

Current habitat based on:

- Temperature
- Precipitation
- Elevation
- Latitude
- Soils
- Slope & Aspect
- Land use
- Competition
- Management

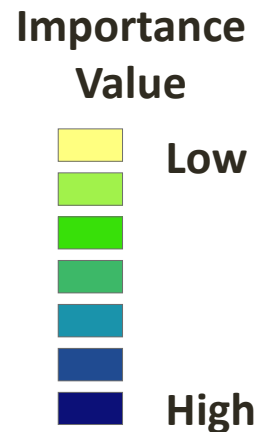


How will species respond?

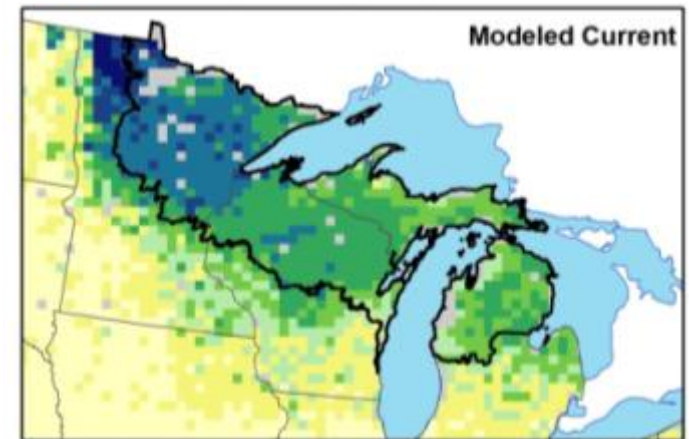
Current habitat based on:

- Temperature
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- Soils
- Slope & Aspect
- Land use
- Competition
- Management

Quaking Aspen



Current Distribution

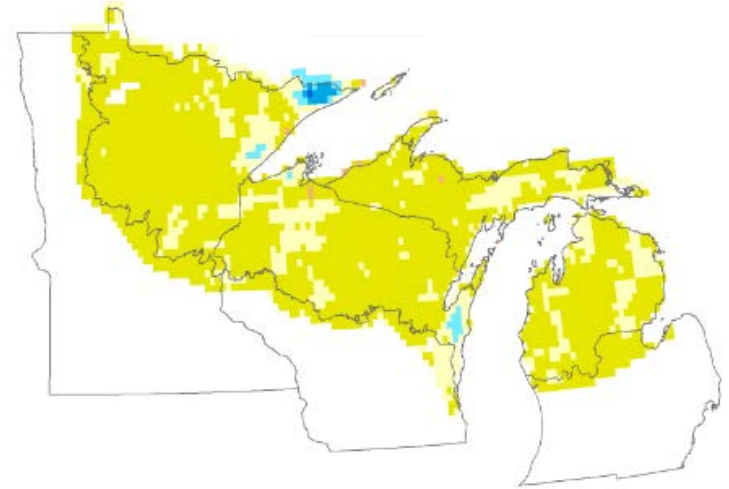


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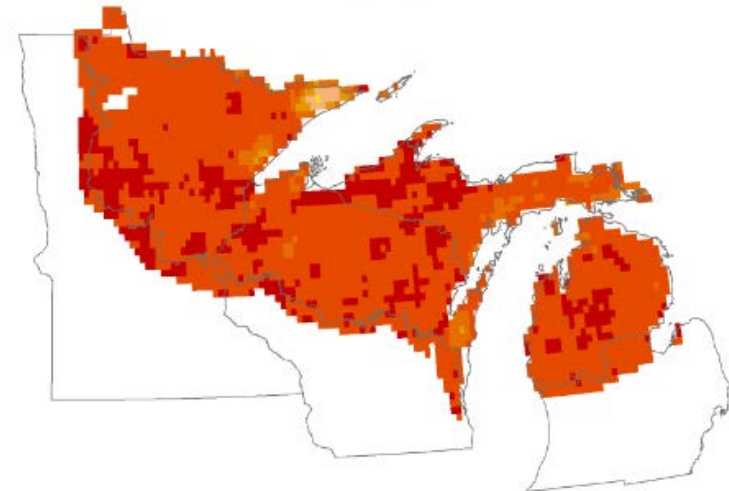
Current habitat based on:

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2070-2100 Low Change - Temperature

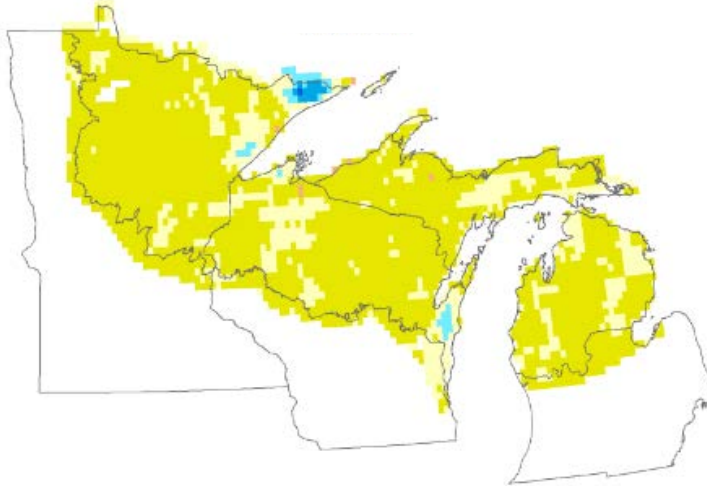


2070-2100 High Change - Temperature

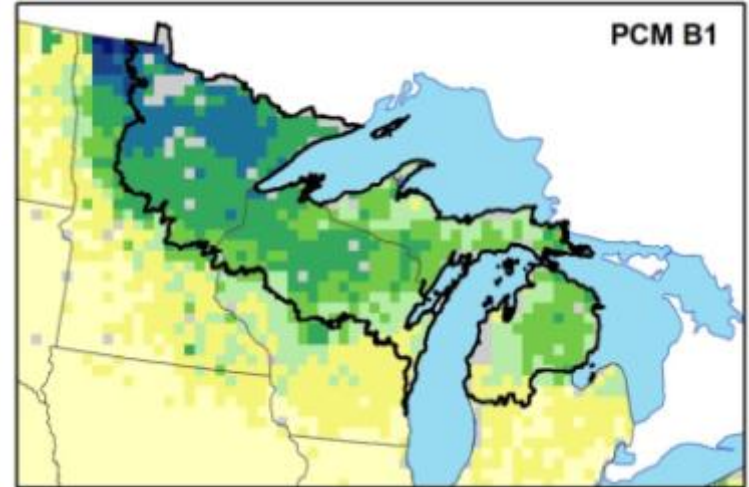


How will species respond?

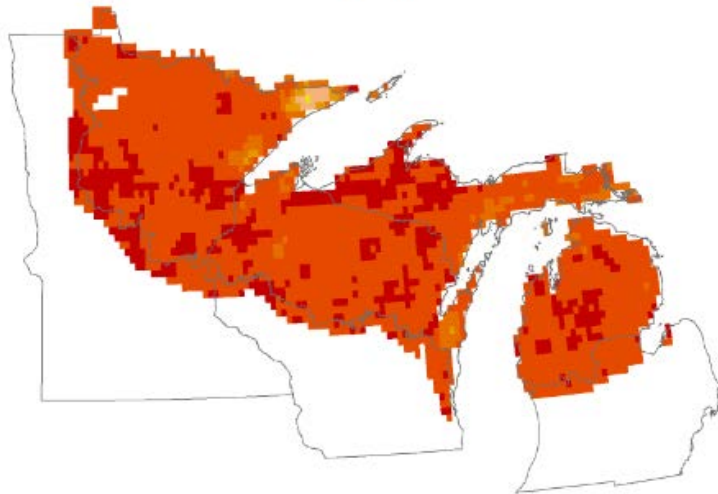
2070-2100 Low Change - Temperature



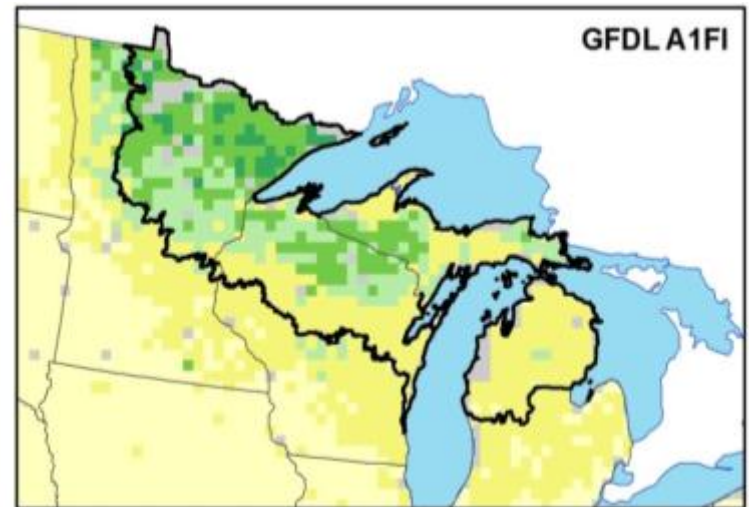
2070-2100 Low



2070-2100 High Change - Temperature



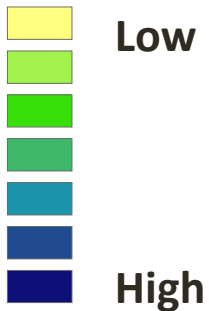
2070-2100 High



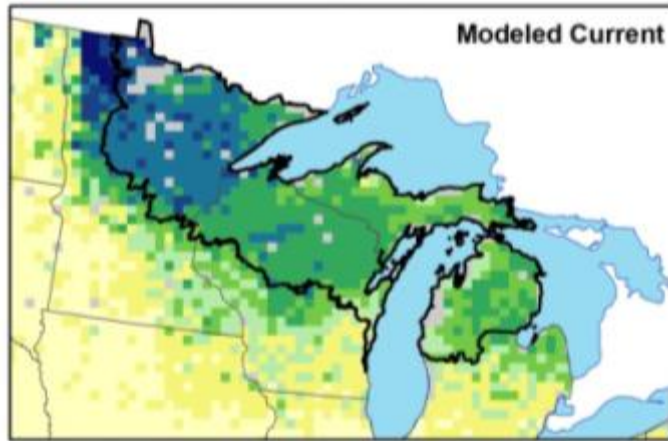
Tree Species Suitable Habitat

Quaking Aspen

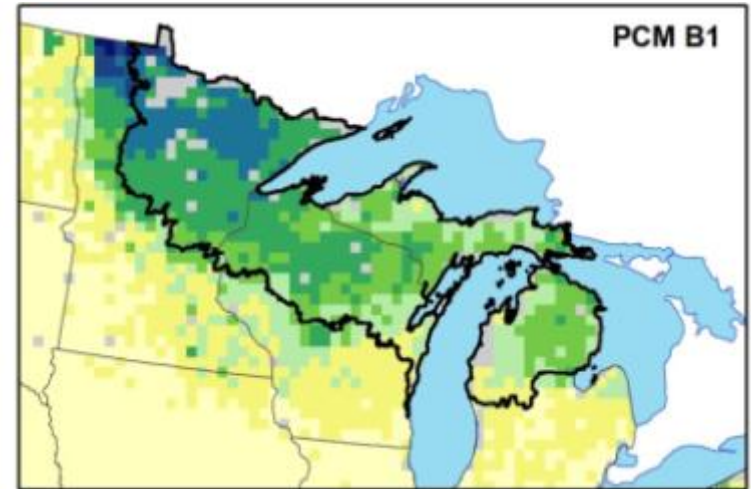
Importance
Value



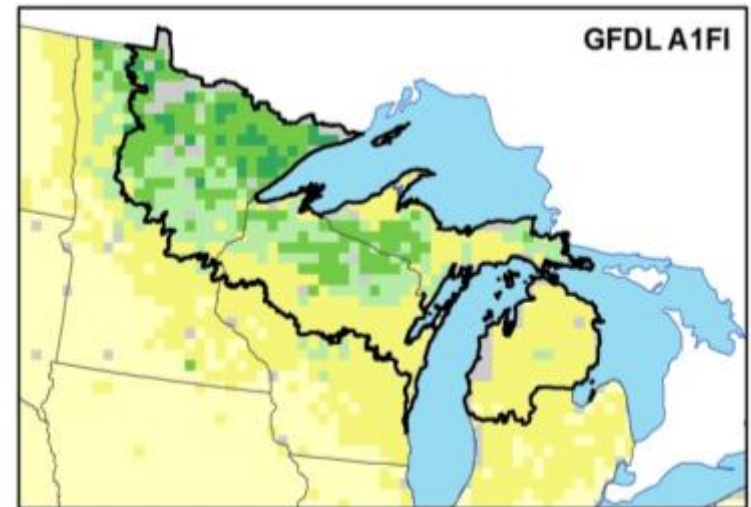
Current Distribution



2070-2100 Low



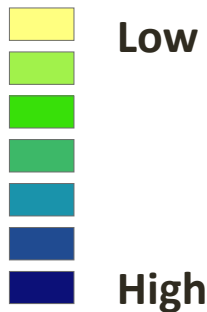
2070-2100 High



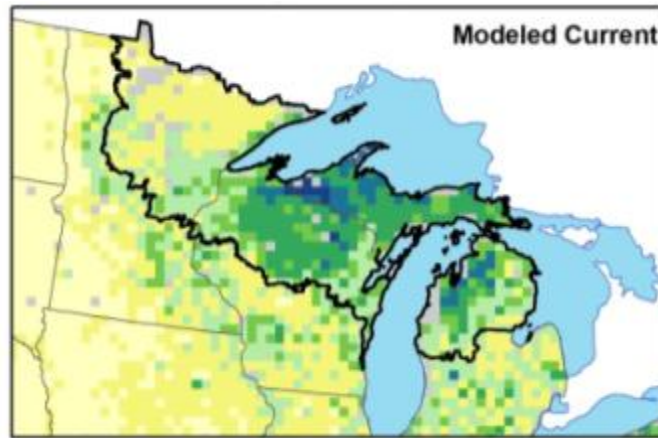
Tree Species Suitable Habitat

Sugar Maple

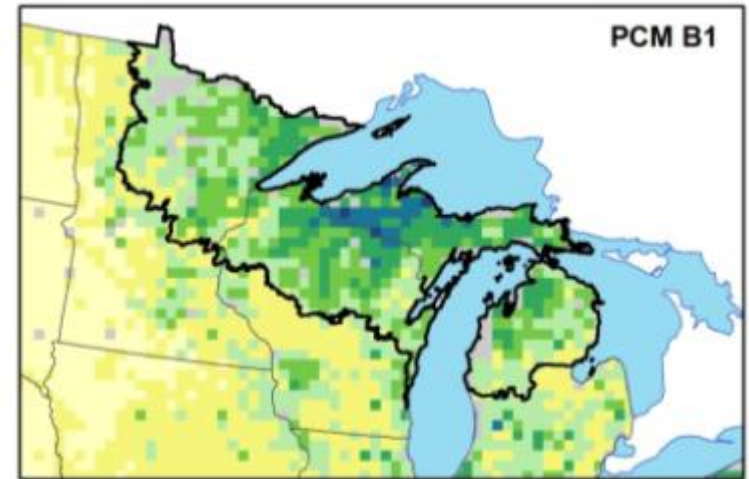
Importance
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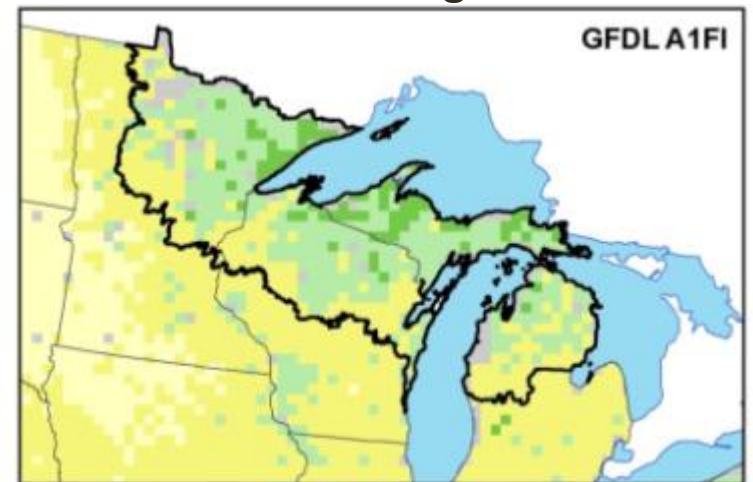
Current Distribution



2070-2100 Low



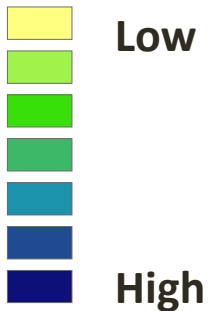
2070-2100 High



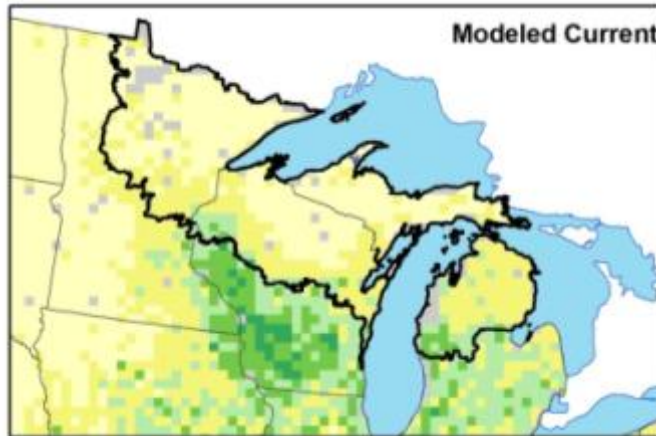
Tree Species Suitable Habitat

White Oak

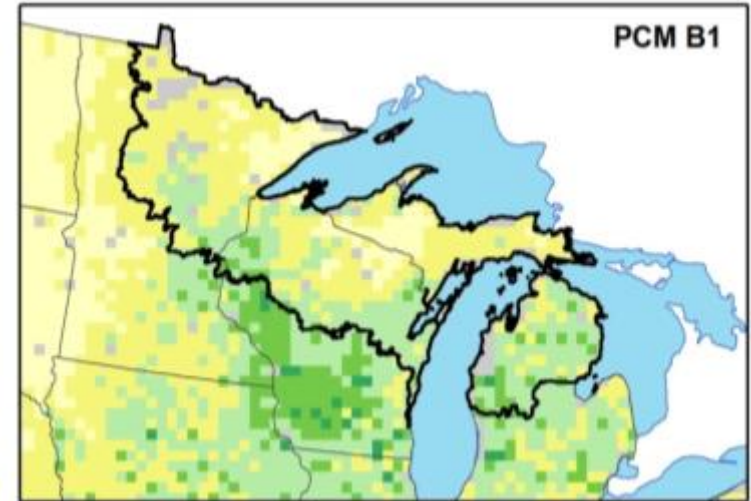
Importance
Value



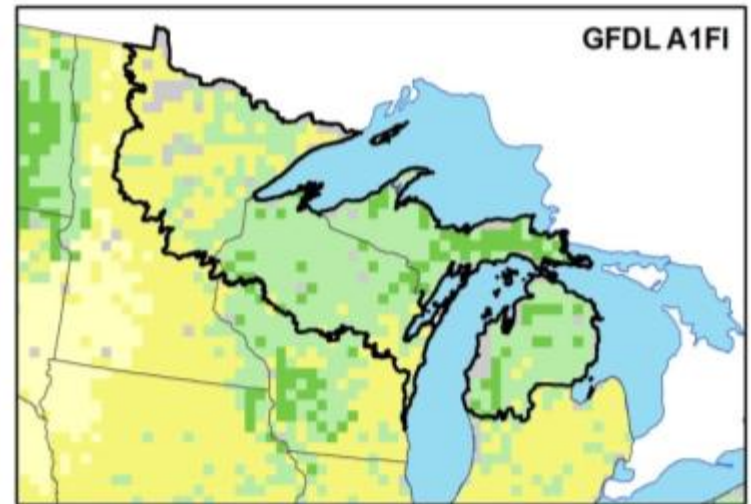
Current Distribution



2070-2100 Low



2070-2100 High



Tree Species Suitable Habitat



Potential “Losers”

- Balsam fir
- Black spruce
- Jack pine
- Northern white-cedar
- Paper birch
- Quaking aspen
- Tamarack
- White spruce

Mixed Results

- American basswood
- Bur oak
- Eastern hemlock
- Red pine
- Sugar maple
- Yellow birch

Potential “Winners”

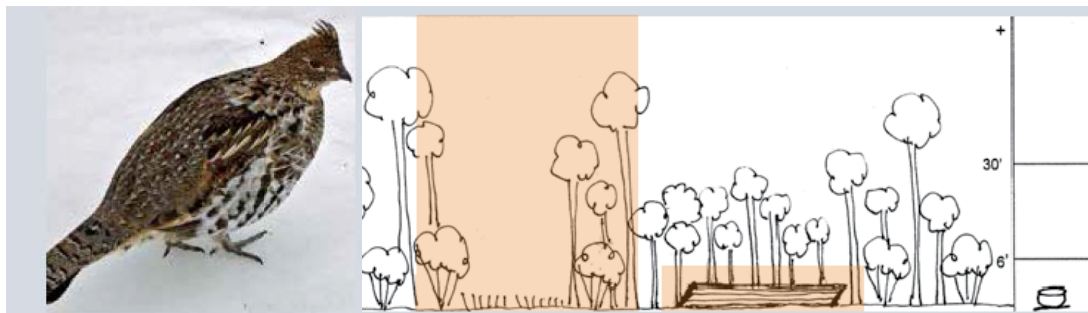
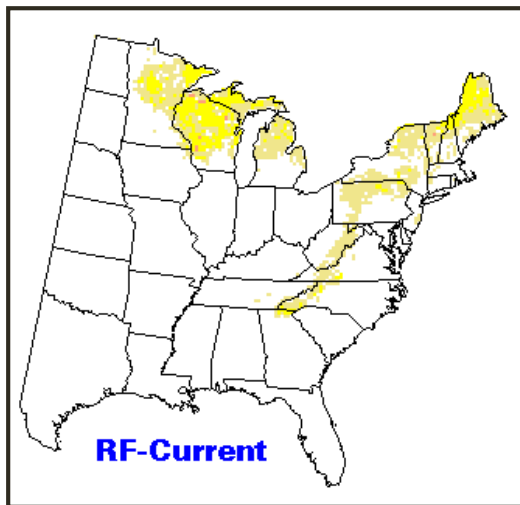
- American elm
- Ironwood
- Black oak
- Black walnut
- Eastern redcedar
- Sassafras
- Scarlet oak
- Shagbark hickory
- Silver maple
- White oak

Bird Species Suitable Habitat

Ruffed Grouse

Current Distribution

Importance
Value



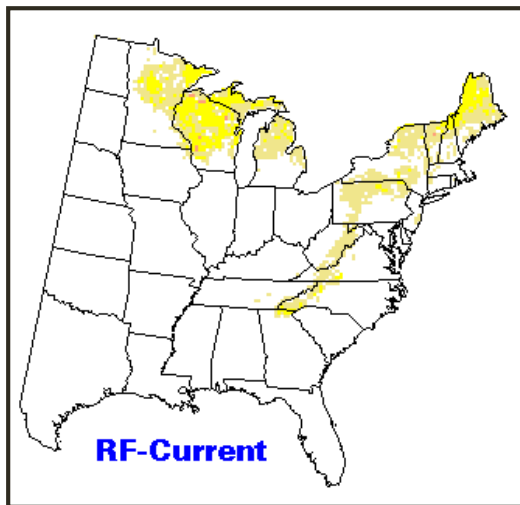
Bird Species Suitable Habitat

Ruffed Grouse

Importance
Value

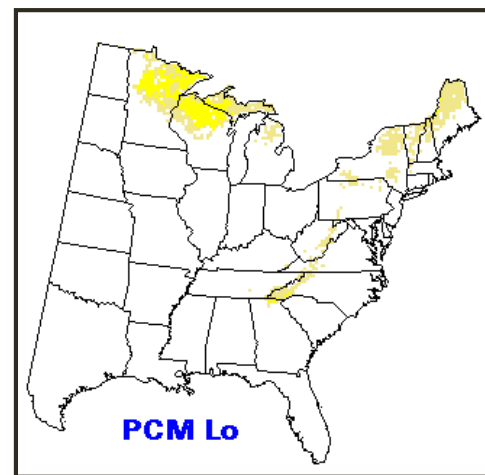


Current Distribution

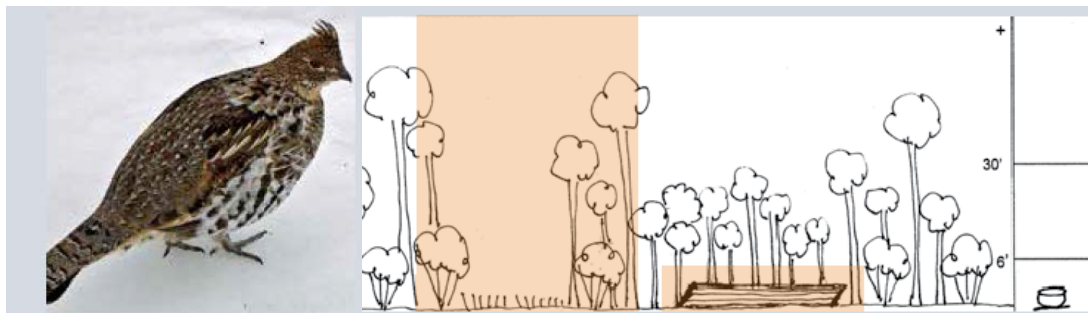
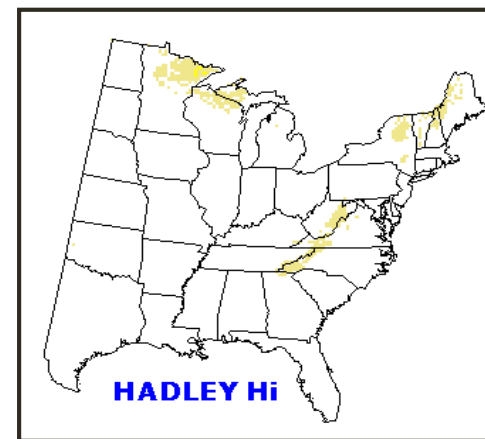


LOW Model Reliability

2100 Low



2100 High



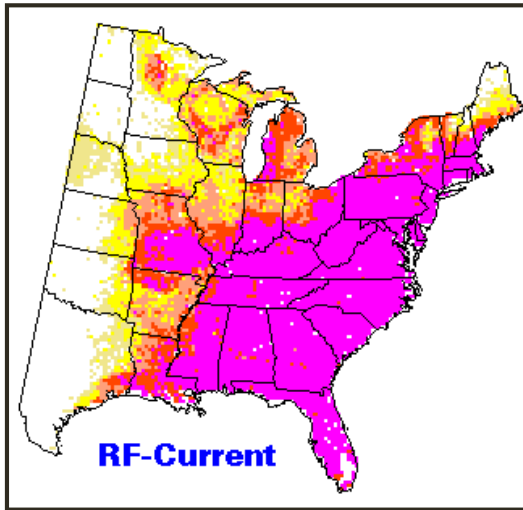
Bird Species Suitable Habitat

Eastern Towhee

Importance Value

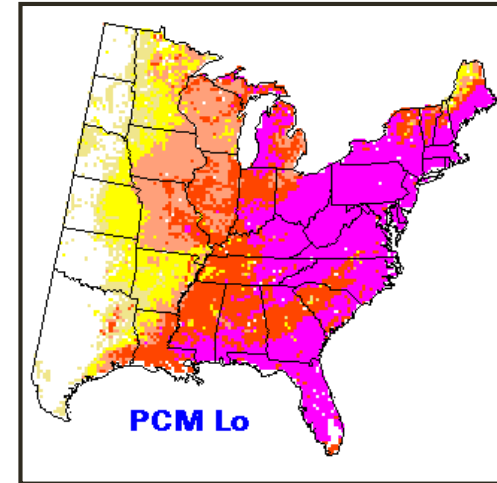


Current Distribution

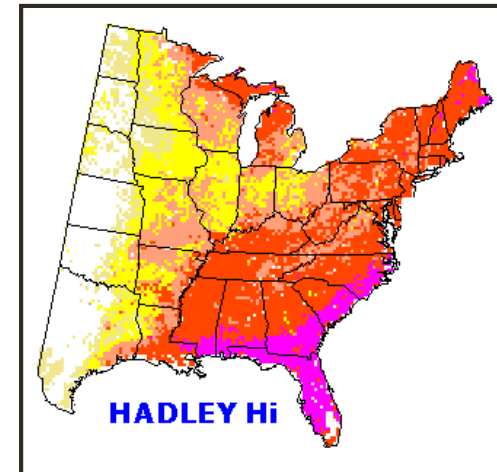


Medium Model Reliability

2100 Low



2100 High



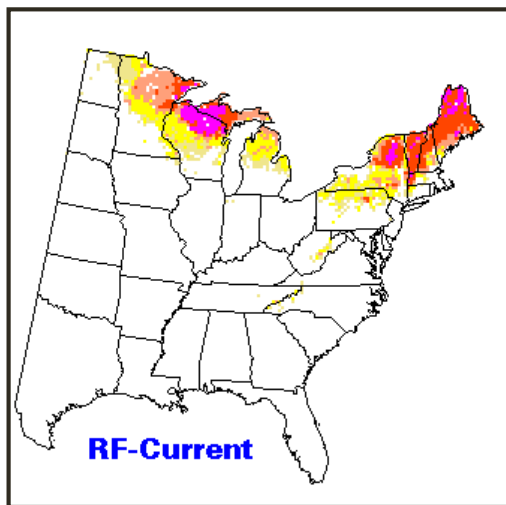
Bird Species Suitable Habitat

Yellow-bellied Sapsucker

Importance Value

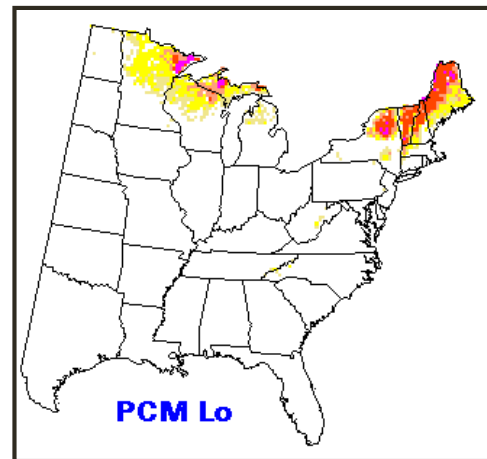


Current Distribution

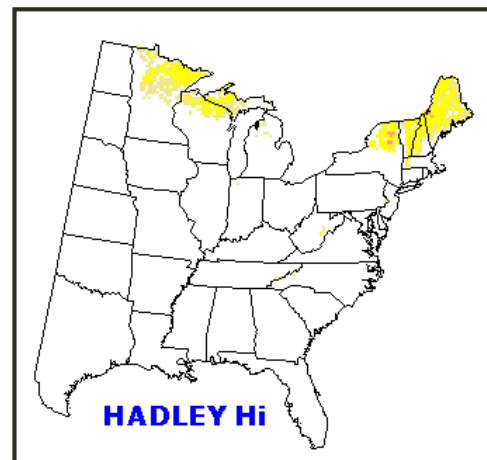


High Model Reliability

2100 Low



2100 High



Bird Species Suitable Habitat



Potential “Losers”

- Hermit thrush
- Mourning warbler
- Canada warbler
- Veery
- Black-throated green warbler
- Yellow-bellied sapsucker

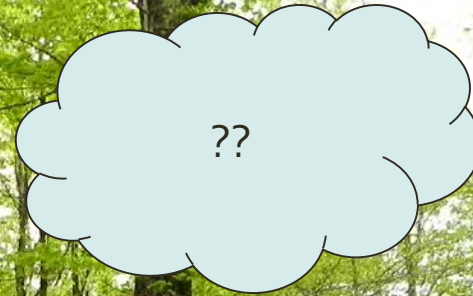
Little Change/Stable

- Eastern wood-pewee
- Song sparrow
- Killdeer
- Wood thrush
- Red-tailed hawk
- Downy woodpecker

Potential “Winners”

- Eastern towhee
- Red-headed & red-bellied woodpeckers
- House finch
- Turkey vulture
- Northern bobwhite
- Yellow-throated vireo
- Northern cardinal

Putting Info into Practice



Invasives

Natural Forest
Dynamics

Desired
Conditions

Timber Sale
Revenue

Forest
Health

Past
Management
History

Plan & Project
Requirements

Wildlife
Habitat

Disturbance:
Past + Future

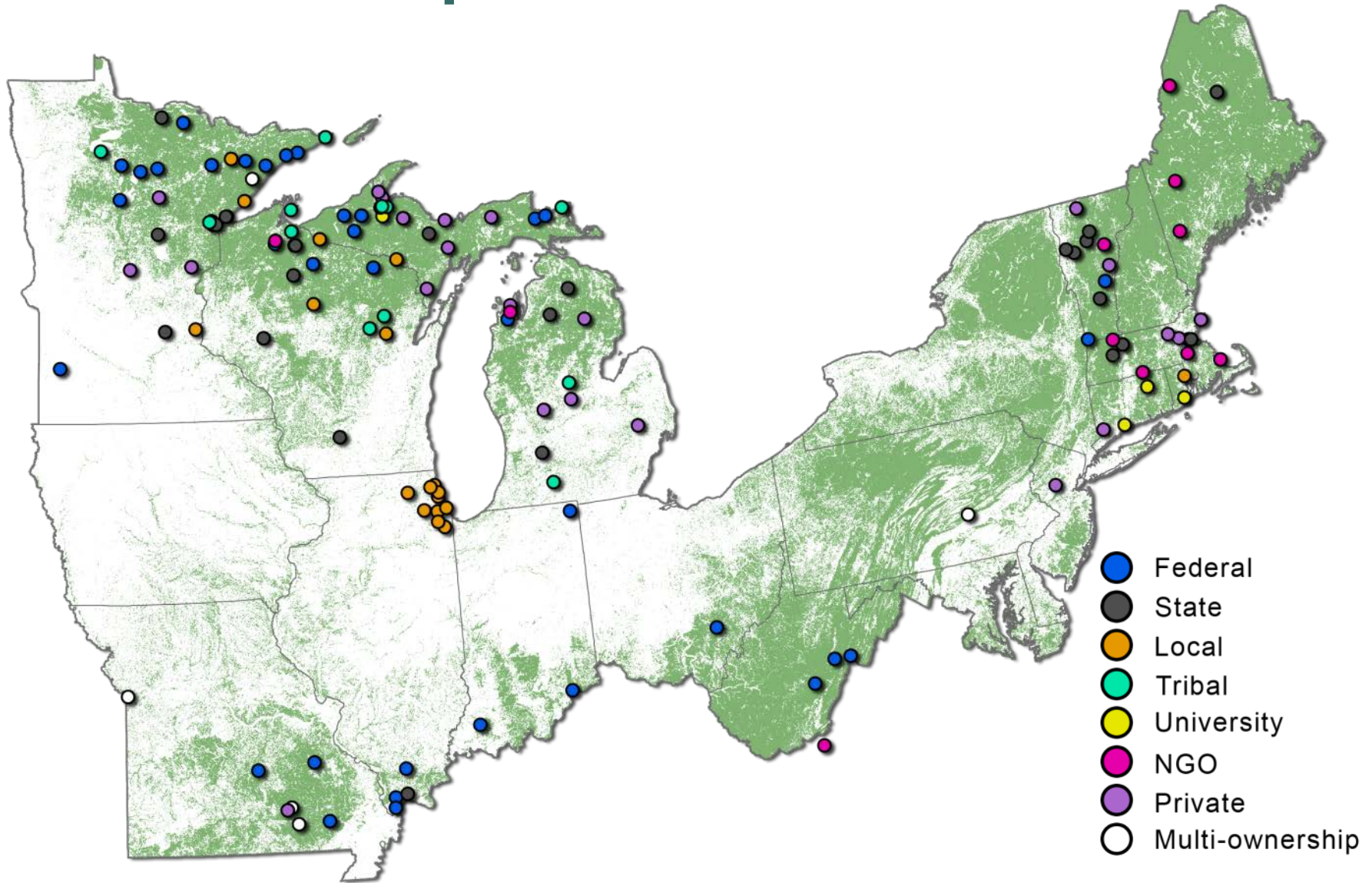
And more!!

Recreation

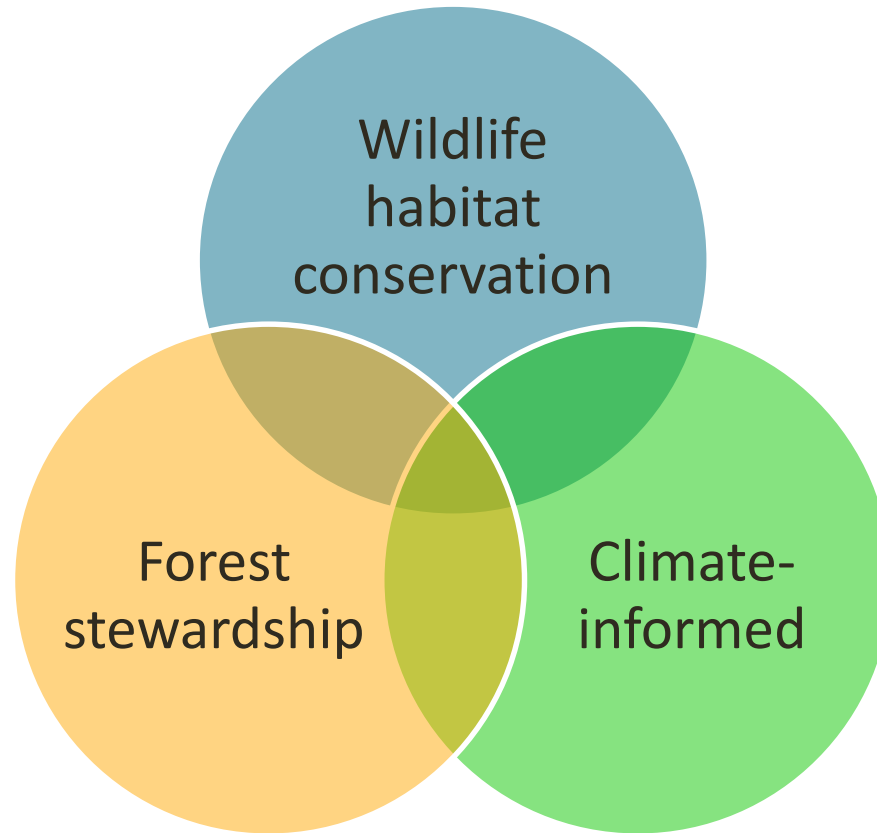
**Climate
Change**



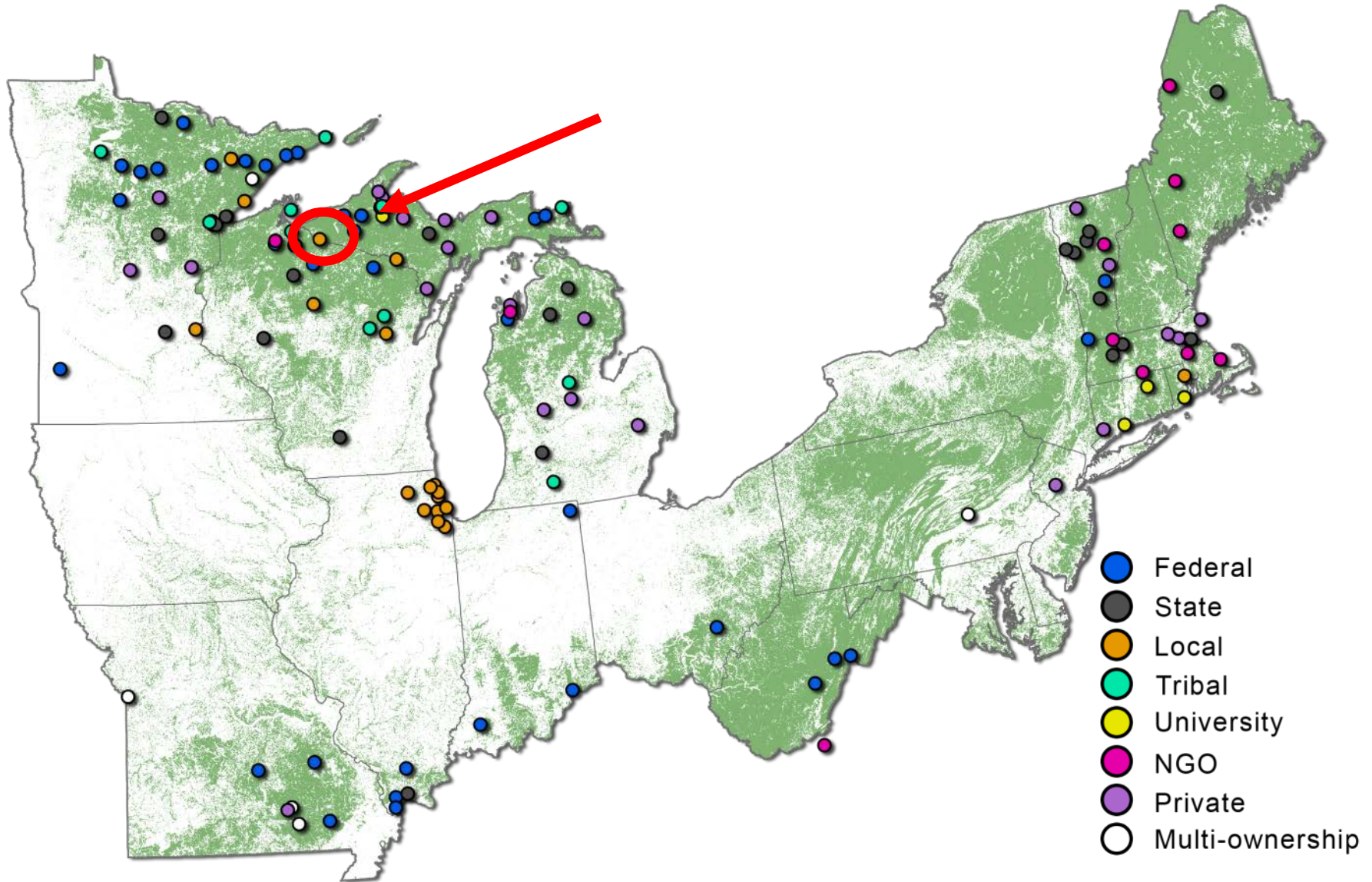
Adaptation in Action



Adaptation: Forests + Wildlife



Adaptation: Forests + Wildlife



Gogebic County: Mosinee GEMS

(grouse-enhanced management system)

- Gogebic County
- 1,100 acres
- Ruffed grouse, woodcock, deer, and snowshoe hare



Gogebic County: Mosinee GEMS

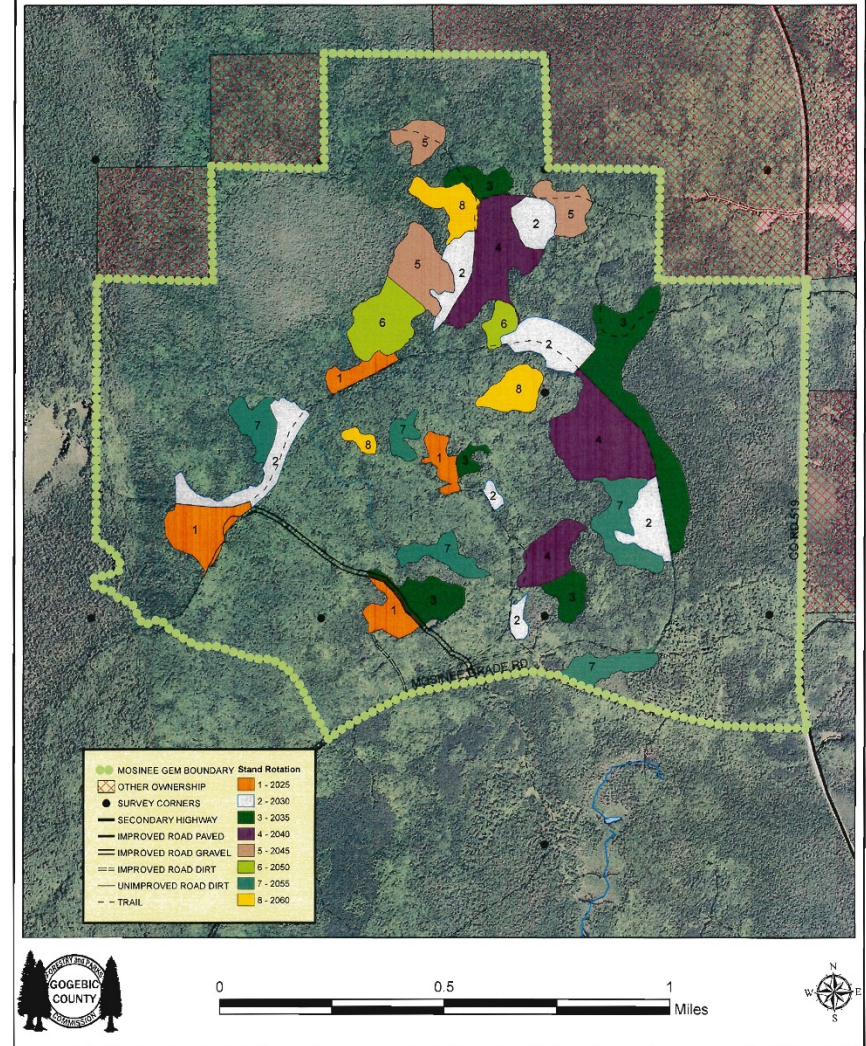
Challenges

- Increased risk of moisture stress
- Long-term decline of quaking aspen
- Trail & access issues

Opportunities

- Species like northern red oak may increase
- Near-term opportunity to regenerate aspen

Appendix 4. Treatment rotation for the Mosinee Grouse Enhanced Management System
(stand rotation: rotation number - year of entry)



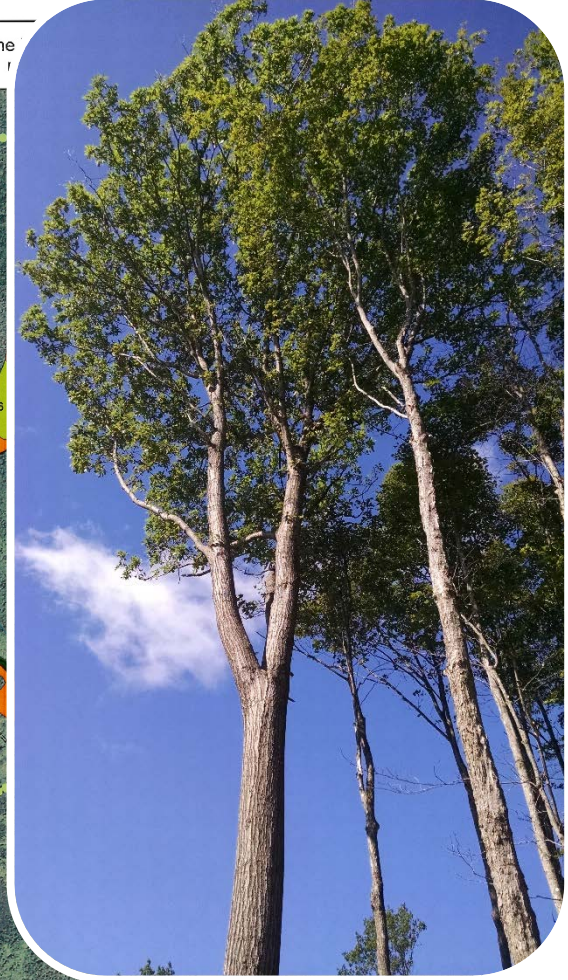
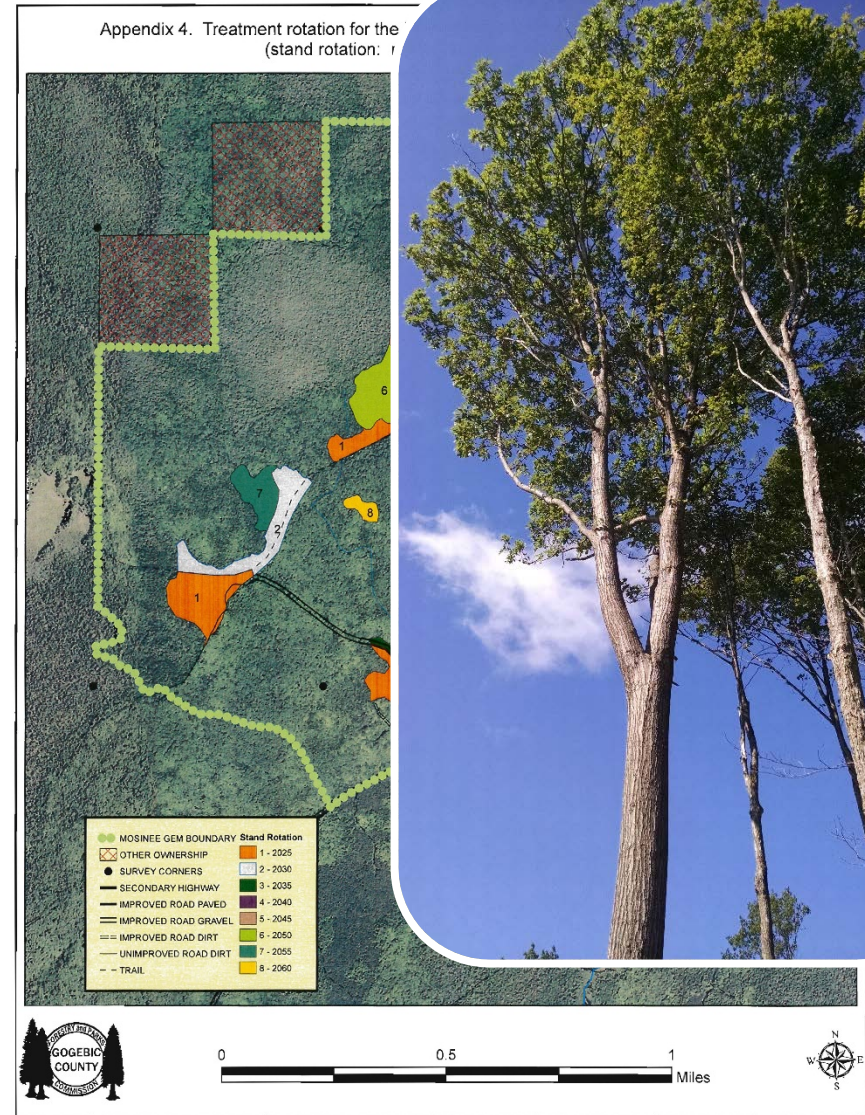
Gogebic County: Mosinee GEMS

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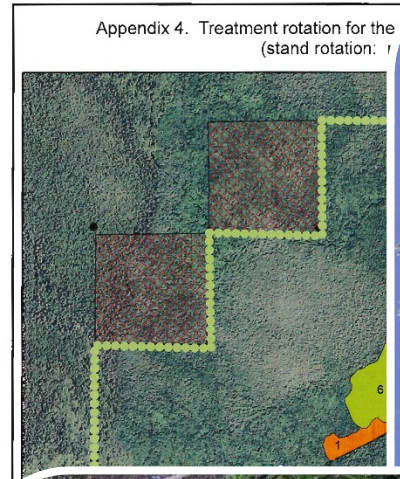
Gogebic County: Mosinee GEMS

Challenges

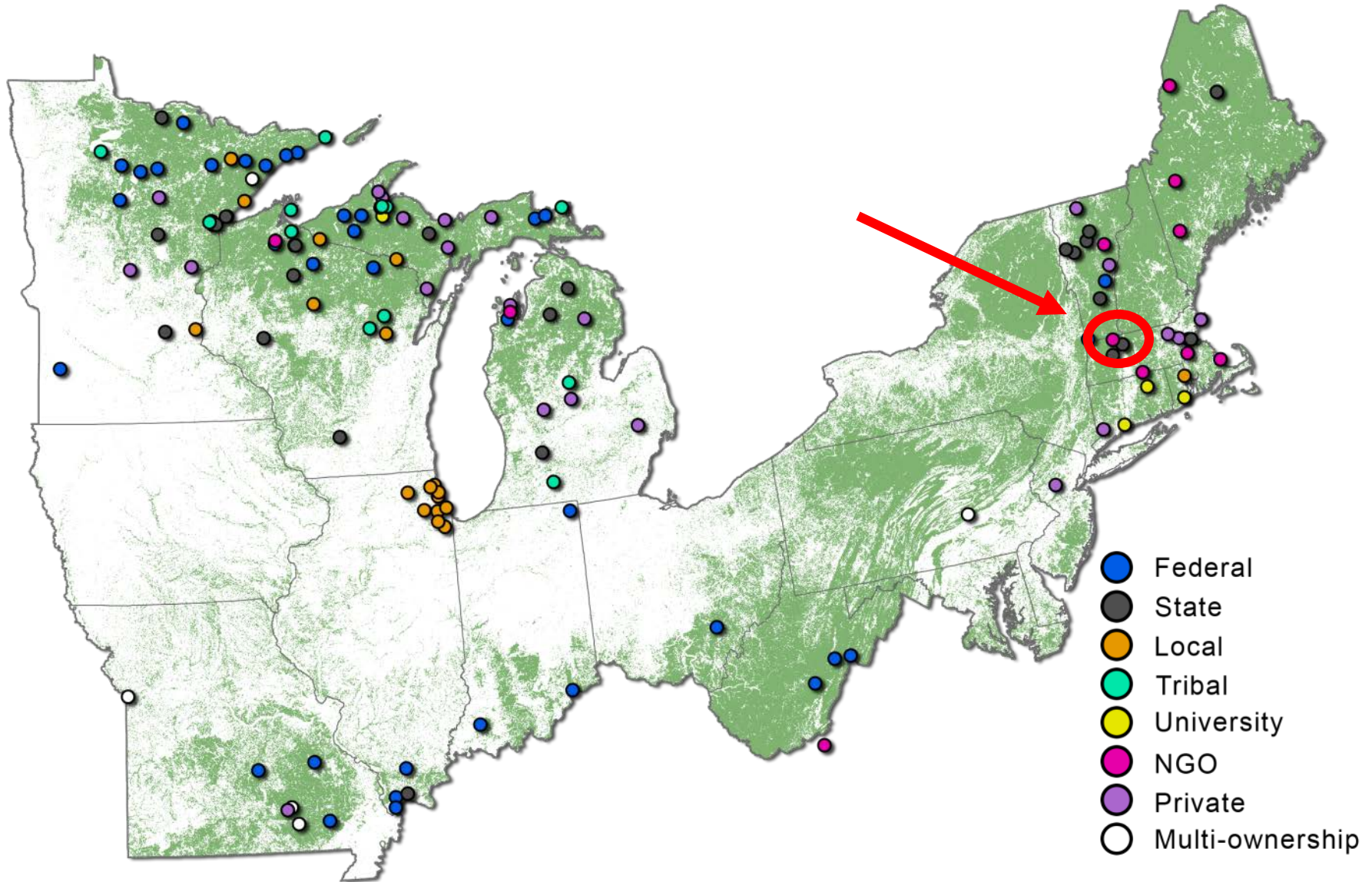
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Adaptation: Forests + Wildlife



Trout Unlimited New England

(w/ Mass. Dept. of Conservation & Rec.)

- State Forest
- Poor stream habitat for aquatic organisms, trout



Trout Unlimited New England

(w/ *Mass. Dept. of Conservation & Rec.*)

- State Forest
- Poor stream habitat for aquatic organisms, trout

Challenges

- Extreme events, flashy streams
- Poor road crossings
- Anticipated decline of hemlock, stream shading



Trout Unlimited New England

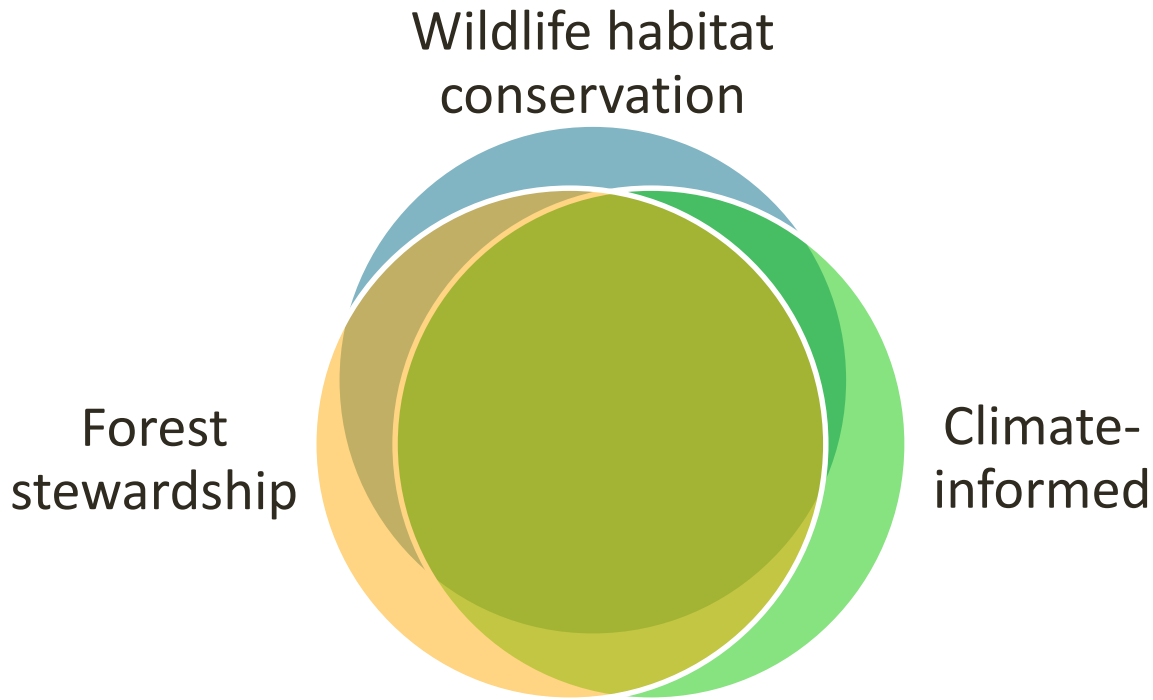
(w/ Mass. Dept. of Conservation & Rec.)

Actions

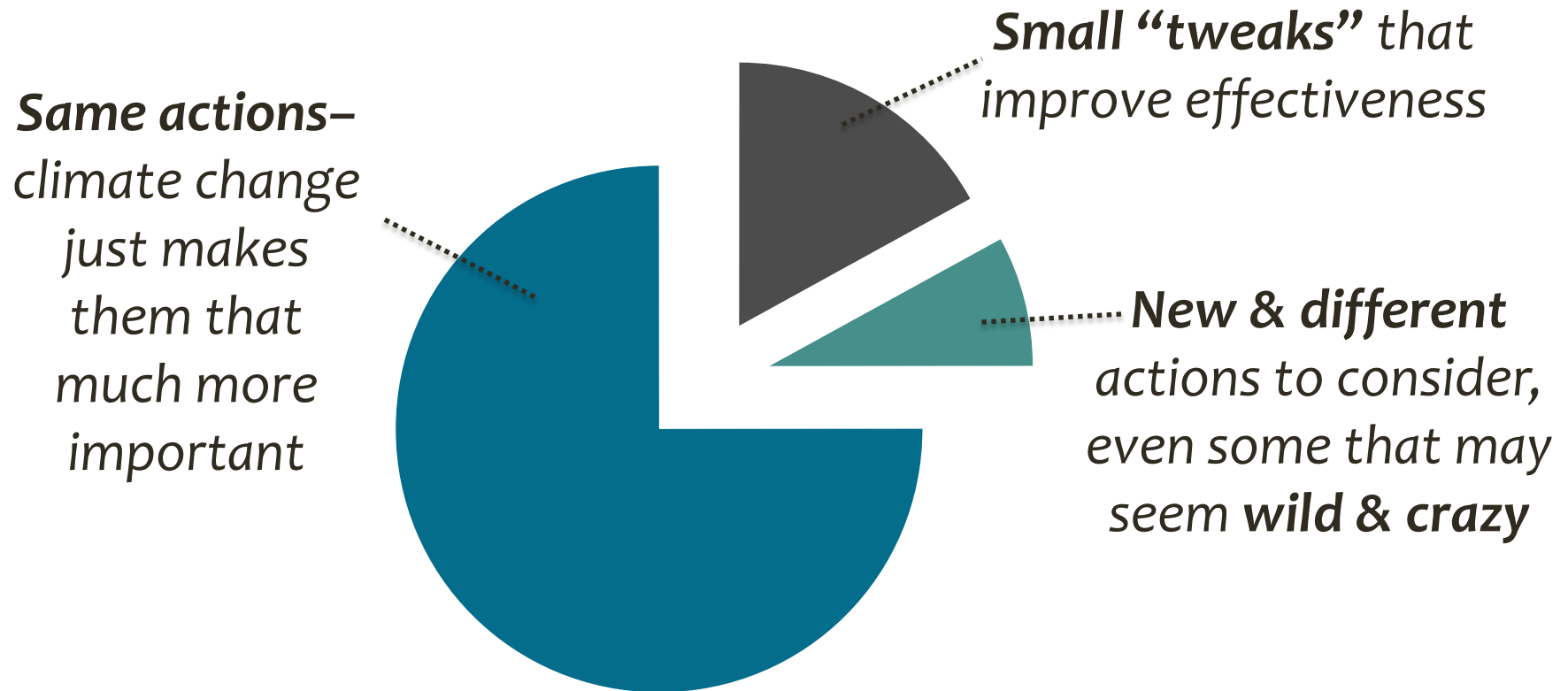
- Riparian management
 - Encourage regeneration of future-adapted species
 - In-stream wood additions
- Culvert replacement
 - Arch or bridge
- Low-water crossing (rock ford)
 - Eliminate culvert and washout issue



Adaptation: Forests + Wildlife



Adaptation: The Real Story



**individual results will vary*

Summary

- Climate change is changing forests.
- Some species will fare better, others worse.
 - True for trees and wildlife
- Site conditions and management actions will influence climate risk and opportunities

